EXD.

THIRTY-SIXTH ANNUAL REPORT

Fiscal Year Ending June 30, 1925

OF THE

Agricultural Experiment Station

OF THE

Alabama Polytechnic Institute

AUBURN

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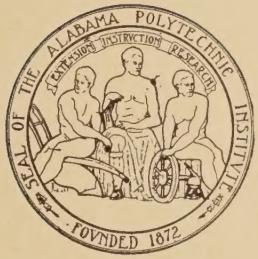

M. J. FUNCHESS, *Director*
AUBURN, ALABAMA

ALABAMA POLYTECHNIC INSTITUTE

COLLEGE OF AGRICULTURE
AGRICULTURAL EXPERIMENT STATION

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EXPERIMENT STATION STAFF

Spright Dowell, A.M., LL.D., President
M. J. Funchess, M.S., Director of Experiment Station
J. H. Trapp, B. S., Secretary
P. O. Davis, B.S., Agricultural Editor
Mary E. Martin, Librarian

Agronomy

M. J. Funchess, M.S.	Agronomist
F. W. Parker, Ph.D.	Soils Chemist
J. T. Williamson, B.S.	Associate Agronomist
H. B. Tisdale, B.S.	Associate Plant Breeder
J. W. Tidmore, M. S.,	Assistant in Agronomy
W. H. Appleton, B. S.	Assistant in Agronomy
W. W. Pate,	Assistant in Agronomy

Animal Industry

J. C. Grimes, M. S.	Animal Husbandman
John E. Ivey, M. S.	Poultry Husbandman
W. D. Salmon, A.M.	Assistant Animal Husbandman

Botany and Plant Pathology

W. A. Gardner, Ph.D.	Botanist
W. L. Blain, M.A.,	Associate Plant Pathologist
Martin Palmer, B.S.	Assistant in Botany

Chemistry (Agricultural)

E. R. Miller, Ph.D.	Research Chemist
M. A. Barnes, B.S.	Assistant Research Chemist

Economics (Agricultural)

J. F. Duggar, M. S.	Agricultural Economist

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M. L. Nichols, M.S.	Agricultural Engineer
J. W. Randolph, M.S.	Assistant Agricultural Engineer
E. C. Easter, M.S.	Assistant Agricultural Engineer

Entomology

J. M. Robinson, M.A.,	Acting Entomologist
H. G. Good, M.S.,	Assistant Entomologist
F. E. Guyton, M.S.	Assistant Entomologist

Horticulture

C. L. Isbell, M.S.,	Acting Horticulturist
R. W. Taylor, B. S.,	Assistant Horticulturist

Veterinary Science

C. A. Cary, B.S., D.V.M.	Veterinarian

CHANGES IN STATION STAFF

Appointments:

W. L. Blain,	Associate Plant Pathologist
W. W. Pate,	Assistant in Agronomy
J. H. Trapp,	Secretary

Resignations:

J. P. Bell,	Secretary

President Spright Dowell,
Auburn, Alabama.

Dear Dr. Dowell:

I have the honor to submit herewith the Thirty-sixth Annual Report of the Agricultural Experiment Station of the Alabama Polytechnic Institute.

Yours very truly,
M. J. Funchess,
Dean and Director.

Alabama Polytechnic Institute
Auburn, Alabama

Gov. W. W. Brandon,
Montgomery, Alabama.

Dear Sir:

I take pleasure in transmitting to you the Thirty-sixth Annual Report of the Alabama Agricultural Experiment Station of the Alabama Polytechnic Institute.

Respectfully,
Spright Dowell,
President.

NEW PUBLICATIONS

Peanut Meal as a Protein Supplement to Corn for Fattening Hogs in the Dry Lot, J. C. GRIMES AND W. D. SALMON (Alabama Station Bulletin 224).—The value of peanut meal as a protein supplement to corn is pointed out. The use of 5 to 7 parts of corn to one part of peanut meal is recommended.

CONTRIBUTIONS TO SCIENTIFIC JOURNALS AND PERIODICALS

GARDNER, W. A.—*Decomposition of Certain Organic Toxins by Vanillin Decomposing Organisms. Science,* 1924., LX, pp. 390 Vanillin decomposing organisms were not able to decompose cumarin, quinoline, benzidine, caffein, or resorcinol. The results suggest specificity of the vanillin decomposing organisms.

GARDNER, W. A.—*The Decomposition of Salicylic Aldehyde by Soil Organisms. Science,* 1924. LX, pp. 503. Bacteria do not grow on, nor decompose salicylic aldehyde in solution cultures.

GARDNER, W. A.—*The Decomposition of Certain Toxins by Known Organisms. Science,* 1926. LXIII, pp. 545. Of twenty microorganisms in pure culture, but two, Psuedomonas pyocyaneus and Bacillus fluorescens liquifaciens, decomposed vanillin, while none of the twenty decomposed cumarin, caffein, or resorcinol.

MILES, L. E.—*A Pyrenomycetous Leaf Spot of Bur Clover. Phytopathology,* 1925. XV, 677-689. A Pyrenomycetous fungus producing a leaf spot of bur clover at Auburn, Alabama, is distinct from either of those causing similar spots on alfalfa and clover, although the host plants are closely related and the microscopic appearance of the lesions produced are quite similar. Sclerotioid bodies from the bur clover seeds produced viable cultures on agar. Similar bodies, produced in culture, were immature perithecia, capable of forming mature asci and ascospores under favorable conditions. All species of bur clover inoculates were susceptible to fungus, but none of the alfalfa or clovers produced typical lesions. The fungus is described as a new species, *Pseudoplea medicaginis* n. sp.

SALMON, W. D., AND LIVINGSTON, CLARE W.—*Vitamins A and B in the Pecan Nut. Jour. Home* Ec., 17, 129-135. The kernel of the pecan nut was found to contain appreciable amount of vitamin A but not as much vitamin B as had been reported previously by Cajori.

TIDMORE, J. W., AND PARKER, F. W.—*Methods of Studying the Strength of Soil Acids. Soil Science,* 18: 331-338. The strength of soil acids was studied by the Troug avidity method, the sugar inversion method, and by determining the H-ion concentration. The results of the three methods correlate well indicating that the H-ion concentration of the soil is largely determined by the acidity of the hydrogen aluminum silicates of the soil.

AGRONOMY

Cotton Variety Tests. (H. B. Tisdale).—Thirty-three strains and varieties of cotton were included in the tests of 1924. The six highest-yielding varieties of this season were Cook 1627, Cook 307, Cook 588, Bottoms, Cleveland (Wannamaker), and Cleveland (Str. 4). Three of the six highest-yielding varieties were originated at the Alabama Experiment Station.

Another variety test was conducted to study the merit of wilt resistant varieties. Cook strains and Petty Toole were the best producers during this season.

Cotton Spacing Test. (H. B. Tisdale).—A new and comprehensive spacing test was conducted in 1924. Spacings used varied from 6 inches to 36 inches in the drill, with the number of plants varying from 1 to 4 per hill, for each spacing. Lowest yields were obtained from very thick and from very wide spacings. The highest yield was made from 2 plants per hill spaced 18 inches apart in the drill.

Time of Applying Nitrate of Soda to Cotton. (M. J. Funchess).—Experiments to determine the best time to apply nitrate to cotton have been in progress a number of years. The highest average yield has been obtained from a split application—one-fourth applied at planting and three-fourths applied as a side dressing at the first cultivation after the cotton was chopped to a stand. Practically the same yield has been obtained from applying all of the nitrate at planting time. Late applications (at time of first bloom) have been much less profitable than early applications.

The Effect of Varying Soil and Climatic Conditions on the Length of Cotton Fiber. (M. J. Funchess).—A cooperative experiment to study the effect of varying soil and climatic conditions on the quality of the cotton fiber was concluded in 1924. The longest fiber was produced at the Tennessee Station at Knoxville, and the shortest at the Alabama Station at Auburn. The average length of staple of all varieties was 1-16th inch greater at Knoxville than at Auburn. Seven varieties—Cook 588, Cleveland (Wannamaker), Trice, Lone Star, Acala, Express and Webber—were grown for four years at Auburn, Alabama; Griffin, Georgia; Starkville and Stoneville, Mississippi; Scott, Arkansas; and Knoxville, Tennessee.

Rate of Fertilizing Cotton With and Without Boll Weevil Control. (M. J. Funchess).—This experiment was started in 1924, and is to be continued indefinitely. The fertilizer treatment varies from 500 to 2000 pounds per acre. Yields this year varied from about 100 pounds on the unfertilized plots to 1304 pounds in the plot receiving 2000 pounds of fertilizer. On the companion plots where the boll weevil was controlled the yield varied from about 100 pounds on the check plots to 1402 pounds on the heaviest fertilized plot. The effect of weevil control methods was most pronounced on the plots receiving 1000 and 1500 pounds of fertilizer respectively.

Corn Variety Tests. (H. B. Tisdale).—The variety test this season included 23 varieties. The five high yielding varieties were Hastings, Weekley, Marlboro, Whatley, and Williamson. No semi-prolific or non-prolific variety is found in the list of leading kinds of corn. The Whatley, Hastings, and Weekley varieties are among the consistent high producers, as shown by the average of results obtained over a period of years.

Time of Applying Nitrate of Soda to Oats. (H. B. Helms).—An experiment was conducted to determine the best time to apply nitrate of soda to oats. The test was on typical Norfolk sandy loam in a rather low state of fertility. The results of the experiment are given in Table 1. They show a large increase in the yield from the use of nitrate of soda and considerable differences due to the time of applying the nitrate. Apparently, the nitrate should be applied between March 1st and 20th. There is no apparent advantage in adding the nitrate in two applications.

Table 1.—Time of Applying Nitrate of Soda to Oats

Plot No.	Fertilization with nitrate of soda		Yield	
	Amount Lbs. per A.	Time of Application	Grain Bu. per A.	Straw Lbs. per A.
1, 4, 8	None		18.1	498
2	200	November 6	21.6	540
3	100	February 20		
	100	March 10	45.2	1255
5	200	March 1	54.2	2145
6	200	March 20	57.3	2775
7	100	March 1		
	100	March 20	54.7	2305

Rate of Absorption of Nitrate of Soda by Oats and Cotton. (W. H. Appelton, H. B. Helms).—Experiments were conducted in the greenhouse to study the rate of absorption of nitrate nitrogen by oats and cotton when applied as nitrate of soda at different stages of plant growth. The general plan of the experiment was to add nitrate to a series of cultures at a certain stage of growth. Then, at intervals of a few days, part of the cultures were harvested and the amount of nitrate absorbed was determined by plant analysis and also by determining the nitrate content of the soil. Cultures that did not reecive nitrate were used as checks to indicate how much nitrogen the plant secured from the soil. With oats these studies were made at four stages of plant growth. With cotton the study was made at three stages of plant growth. The results may be summarized as follows:

When sodium nitrate at the rate of 400 pounds per acre was applied to oats 14 days after planting absorption of the nitrate was very slow for three weeks. After the third week absorption increased and all nitrate was absorbed by the close of the seventh week.

When the nitrate was applied to oats at later stages of growth

the rate of absorption was more rapid. Nitrate applied 42, 70, and 92 days after planting was completely absorbed in 20, 14, and 10 days, respectively.

With both oats and cotton there was a close correlation between the rate of growth and the rate of nitrate absorption.

Sodium nitrate at the rate of 600 pounds per acre was applied to cotton 14, 40, and 61 days after planting. Absorption of the nitrate was complete in 36, 14, and 11 days respectively.

The results of both experiments indicate that the loss of soluble nitrogenous fertilizer by leaching may be reduced by delaying the application until the crop will absorb it rapidly.

The Influence of the Nature of the Replaceable Base on the Heat of Wetting of Soils and Soil Colloids. (W. W. Pate).—The influence of the nature of the replaceable base on the heat of wetting of soils was studied by saturating soils with different bases and determining the heat of wetting. A similar study was made with colloid extracted from some of the soils. In all cases the soil or colloid saturated with a monovalent base gave a lower heat of wetting than the soil or colloid saturated with a divalent base.

The extracted colloid from different soils gave different heats of wetting and contained different amounts of total replaceable base. The colloid with a high replaceable base content gave a high heat of wetting, whereas the colloid with a low replaceable base content gave a low heat of wetting. Apparently the amount of replaceable base is an important factor in determining the heat of wetting of soil colloids.

A study from the data from publications of the Bureau of Soils shows that there is a good correlation between the chemical composition of soil colloid, its heat of wetting, and the amount of ammonia and dye it will absorb. Colloids having a high SiO_2:R_2O_3 ratio have a high heat of wetting and absorb large amounts of ammonia and dye. Colloids having a low SiO_2:R_2O_3 ratio have a low heat of wetting and absorb small amounts of ammonia and dye.

It is probable that there is a good correlation between the SiO_2:R_2O_3 ratio of soil colloids and their content of replaceable base. This problem is being studied.

The Relationship Between Plant Response to Lime, Phosphate, and Potash and the Need for These Treatments as Indicated by Laboratory Tests. (F. W. Parker).—Bulk samples of twenty-three soils were obtained from the lower coastal plain division of the State. The soils were used in greenhouse and laboratory tests to study the relation between plant response to lime and fertilizers and the need for lime and fertilizers as indicated by laboratory tests. Melilotus and sorghum were the test plants used in the greenhouse work. The laboratory tests included the Troug soil acidity test, determination of H-ion concentration of the soil, calcium and phosphorus soluable in N/5 HNO_3, and total exchange capacity of the soil.

The results show a general correlation between the results of the laboratory tests and the plant response to lime and fertilizers. The best correlation was found between the results of acidity tests and the plant response to lime. However, in the twenty-three soils there were several that were decided exceptions to the general correlation. It seems probable that better laboratory methods will have to be developed before one can determine, with any degree of accuracy, the phosphorus and potash requirements of soils by laboratory tests.

Carbon Dioxide Content of the Soil Air as a Factor in the Absorption of Inorganic Elements by Plants. (F. W. Parker).—This is a continuation of the study reported last year. Two experiments were conducted dealing with the influence of the removal from the soil air and the addition to it of carbon dioxide on the absorption of inorganic elements by plants. In the first experiment, rape, oats, and crimson clover were grown on a poor sandy soil without fertilizer additions other than nitrate. In the second experiment cowpeas and sorghum were grown in cultures receiving rock phosphate, acid phosphate, and no phosphate. In all cases the yield, ash, calcium, and phosphorus contents were determined. The results obtained in the experiment may be summarized as follows:

The removal from the soil air or the addition to it of carbon dioxide did not influence materially the yield in either experiment.

The phosphorus content of the plant was slightly increased by the addition of carbon dioxide to the soil air under the conditions of the first experiment. However, the results of the second experiment indicate that the availibility of rock phosphate is not influenced by alterations in the carbon dioxide content of the soil air.

In most instances the carbon dioxide treatments did not influence the calcium content of the plant. However, in the case of cowpeas the addition of carbon dioxide apparently caused a slight increase in the calcium content.

In most cases the ash content of the plant was not influenced by the carbon dioxide treatment. The most striking exception was with oats where the addition of carbon dioxide increased and the removal of carbon dioxide reduced the percentage of ash.

The Colorimetric Determination of Phosphorus and the Absorption of Phosphorus by Pasteur-Chamberland Filters. (F. W. Parker).—In a study of the phosphorus content of the soil solution it became necessary to secure an accurate method for the determination of small quantities of phosphorus. The Coeruleo-molybdate method was finally adopted for use. The method makes possible the determination of 0.02 p.p.m. PO_4 in 50 cc of solution. The accuracy of the method was tested by comparing results obtained with it and with standard volumetric method of determining phosphorus.

It was found that Pasteur-Chamberland filters that had been used in preparing soil extracts contained considerable phosphorus that is soluble in water or in solutions of low phosphate content.

Used filters absorbed considerable phosphorus from phosphate solutions of known concentration and from soil extracts containing 0.09 and 0.6 p.p.m. PO_4. New Pasteur-Chamberland filters did not absorb phosphorus but contained considerable phosphorus soluble in water.

Treatment of used filters with strong hydrochloric acid and subsequent ignition in an electric furnace did not completely destroy the phosphate absorbing power of used filters.

ANIMAL INDUSTRY

Soft Pork Project. (W. D. Salmon).—Last year we reported that a ration of 5 parts of corn and 1 part of peanut meal did not have a softening effect on hogs that had not received previously any softening feeds. This year a group of hogs was fed peanuts for 6 weeks and then changed to the same ration of corn and peanut meal that was used in last year's test. Table 2 gives a summary of the feeding results.

Table 2.—Peanuts in Dry Lot Followed by Corn and Peanut Meal

Hogs and Feed	First Period Whole Peanuts	Second Period Corn 5 lb. Peanut meal 1 lb.	Third Period Corn 5 lb. Peanut meal 1 lb.
	42 days	56 days	52 days
No. of hogs	24	19	12
Average initial weight, lbs.	26.4	94	147
Average daily gain, lbs.	1.17	1.37	1.20
Feed for 100 lbs. gain			
Peanuts	354	—	—
Corn	—	325.8	466.0
Peanut Meal	—	65.1	93.2
Mineral Mixture	8.6	13.6	8.0
Total	362.6	404.5	567.2

The hogs were so soft at the end of the period of feeding on peanuts they were not made hard even after 16 weeks feeding on the ration of corn and peanut meal.

Effect of Minerals on Growth and Reproduction. (W. D. Salmon).—The effect of acid phosphate on reproduction as reported last year has been confirmed by later studies. The addition of cod liver oil and dried meat to the original basal diet of corn and peanut meal did not improve the results when acid phosphate was used. Increasing the acid phosphate to 3 per cent of the total diet made no improvement. The addition of sufficient sodium bicarbonate to neutralize the excess of free acid carried by the acid phosphate enabled the rats to raise

young. The young grew to maturity and reproduced on the neutralized diet.

Vitamin B in the Excreta of Rats on a Diet Low in This Factor. (W. D. Salmon).—It was found that the feces of rats may be rich in vitamin B even when the diet does not contain demonstrable amounts of this factor. The vitamin was apparently not produced by the growth of mould on the excreta after they were voided. Ingestion of excreta may introduce appreciable error into determinations of vitamin B when the rats are not caged on raised screens.

BOTANY

Soil Toxin Investigations. (W. A. Gardner).—Vanillin, cumarin and resorcinol decomposing organisms are very common and widely distributed. Cinnamic acid, caffein, and quinone are decomposed by the organisms of about two-thirds of the widely distributed soils tested. Hydroquinone is decomposed by about one-third of the widely distributed soils examined. About three-fourths of the soils from the several states contain organisms able to decompose pyridine and piperidine. A few soils contain benzidine decomposing organisms. Vanillin, cumarin, cinnamic acid, and resorcinol decomposing organisms occur in one or more soils from each of nine states. In the order of mention, quinone, hydroquinone, caffein, pyridine, piperidine, and benzidine decomposing organisms occur in a decreasing number of states.

Physiology of Sweet Potatoes. (W. A. Gardner).—Studies on the physiology of sweet potatoes show a reciprocal relation between the decrease of starch and the depression of the freezing point of the expressed juice. In general the depression of the freezing point becomes greater as the season progresses. As the sweet potato root grows the percentage of moisture rapidly decreases, the percentage of starch correspondingly increases, the percentage of non-reducing sugar gradually increases, and the percentage of reducing sugars remain very nearly constant.

Except for the more or less direct effects of curing, Porto Rico sweet potatoes underwent similar changes in moisture to those not cured but stored in the same room. Those stored in the bank lost less moisture than those cured or uncured but stored in the house. The results with carbohydrates are mostly in harmony with those of last year. The data obtained with Triumph sweet potatoes indicate that a high percentage of moisture is usually accompanied by a low percentage of starch.

The percentage of sucrose was greater in cured than uncured, and greater in uncured than in banked Triumph sweet potatoes. The percentage of reducing sugar was increased by harvesting, but was affected little by method of storage.

The removal of tops resulted in an increase in percentage of

moisture, a decrease of starch and sucrose, and no important change in percentage of reducing sugar.

Disease Resistance in Sweet Potatoes. (Walter L. Blain).—Vine cuttings of 18 varieties of sweet potatoes secured from Porto Rico were tested for resistance to sweet potato black rot and stem rot but both the inoculated plants and checks gave negative results.

CHEMISTRY (Agricultural)

Non-Protein Nitrogen of the Velvet Bean. (E. R. Miller and M. A. Barnes).—(1) **Seed.** By several different methods protein was removed from aqueous extracts of velvet beans and the non-protein nitrogen determined in the filtrate. On the average of 4 per cent of total nitrogen and 0.51 per cent non-protein nitrogen were found. The latter consists mainly of acid amide nitrogen, basic nitrogen, and amino acid nitrogen, the latter predominating.

Long continued extraction with 90-95 per cent alcohol removes nitrogen compounds equivalent to 0.35 to 0.4 per cent nitrogen. A large part of this is amino acid nitrogen and is present mainly as 3-4-dihydroxyphenylalanine.

(2) **Pods.** The average of several determinations showed the presence of 0.609 per cent total nitrogen and 0.166 per cent non-protein nitrogen.

Velvet Bean Ration for Brood Sows. (E. R. Miller, W. D. Salmon).—With a ration consisting of more than 60 per cent of authoclaved velvet beans with normal ration, sodium chloride, calcium carbonate, cod liver oil, and yeast a litter of nine pigs was raised to an average weight of 29.1 pounds at the age of eight weeks.

Normal results were obtained with the use of a ration consisting of 25 per cent of cooked velvet beans and 75 per cent of normal ration. The results were a decided improvement over those obtained with the same ration when the velvet beans were fed raw.

It was found this year that the addition of yeast to a ration of velvet beans and mineral matter produced much better results than the addition of cod liver oil alone to this ration. The addition of both cod liver oil and yeast again produced the best results.

Two gilts from a sow which had been fed a ration consisting of 25 per cent velvet beans and 75 per cent normal ration were continued on the same ration. After breeding one was put on a 25 per cent cooked velvet bean ration and the other on a 25 per cent raw velvet bean ration. The sow that received the cooked beans farrowed seven pigs and raised four, averaging 30.6 pounds at the age of eight weeks. The one on the raw bean ration farrowed four pigs all of which were dead within a week.

Velvet beans supplemented by yeast for the first 75 days

of the gestation period, then followed by normal ration produced no better results than the same ration without yeast.

Three sows were allowed the run of a velvet bean field for 60 days after breeding and were then put on a normal ration in dry lot. They raised twenty-two pigs which averaged 31.5 pounds at the age of eight weeks.

The Estimation of Acid Amide Nitrogen. (E. R. Miller and C. R. Saunders).—The following results were obtained by the usual method of distillation with magnesia and also by hydrolyzing for thirty minutes with twenty per cent hydrochloric acid as suggested by Hart. In the case of salicylamide 9.131 per cent nitrogen was obtained by hydrolyzing one hour. The acid amides used were obtained from the Eastman Kodak Company.

Acid amide	% Total N by Kjeldahl method	% N by distillation with MgO	% N by hydrolyzing with 20% HCl for 30 min.	Theoretical % of amide nitrogen
Butyramide	16.026	0.535	15.814	16.08
Benzamide	11.640	0.308	10.785	11.57
Salicylamide	9.951	0.269	7.543	10.22
Oxamide	27.750	20.314	26.855	31.82
Malonamide	25.510	2.929	26.375	27.45
Acetamide	23.650	0.639	22.515	23.72
Urea	46.130	4.410	4.940	46.65
				*10.60
Asparagine	18.740	1.203	8.850	*21.21
n-Valeramide	13.635	0.843	13.259	13.85

*Total Nitrogen.

Judging from these results distillation with MgO cannot be depended upon as a means of estimating acid amide nitrogen.

Non-Protein Nitrogen of the Tracy Velvet Bean Seed. (E. R. Miller and C. R. Saunders).—The average of several determinations shows the presence of 3.8 per cent total nitrogen and 0.578 per cent non-protein nitrogen. The latter consists mainly of amino acid nitrogen with a small amount of basic nitrogen. No satisfactory quantitative estimation of dihydroxyphenylalanine has so far been made for any variety of velvet bean. On the supposition that it is the only amino acid present, formol titration of aqueous extracts indicates the presence of approximately 4 per cent of this substance.

ENGINEERING (Agricultural)

A study of Fundamental Factors Influencing the Traction of Wheel Tractors. (J. W. Randolph and M. L. Nichols).—The traction study should show that the greatest factor in the transmission of force from any lug depends upon the tractor taking fullest advantage of the arch action of a soil. The resistance to shear determines the tractive value of a soil. If the soil is confined by a rim (or arch action) the shear area is increased by

bringing the line of shear nearer parallel to the surface of the ground, the shear angle of unconfined soil being 45 degrees. The compressing action of the rim increases not only the arch action, but the shear value per square inch.

With a given width of rim output increases up to maximum as the weight carried by the wheel is increased up to a certain point. With further increase in weight, the output decreases. The highest force ration (efficiency) is produced with a weight carried by the wheel just sufficient to force the lug into the soil. Output increases with the width of rim when the weight is sufficient to force the lugs into the soil.

ENTOMOLOGY

Control Turnip Webworm (*Hallula Undalis*). (J. M. Robinson).—Tests were made with Sodium Fluosilicate and different dilutions of calcium arsenate to control the larvae of the turnip webworm on collards. Sodium Fluosilicate reduced the larvae from 28 per ten plants to 15 larvae after four applications at weekly intervals. There was only slight burning of foliage after the fourth dusting. The check advanced from 51 larvae per ten plants to 100 larvae.

The best control was obtained when calcium arsenate was used at the strength manufactured to control boll weevils. The infestation was 11 larvae per ten plants after first application of dust. The infestation dropped to 5 larvae and then remained at 2 larvae for the next two weeks. As the calcium arsenate was diluted with hydrated lime the infestation increased. Table 3, below, is a record of results.

Table 3.—Showing Materials, Record of Living Larvae, and Leaves Burned.

Date Dusted	Sodium Fluosilicate 1 lb. Hydrated Lime 9 lbs.		Check	Calcium Arsenate 1 lb. Hydrated Lime 9 lbs.		Calcium Arsenate 5 lbs. Hydrated Lime 5 lbs.		Calcium Arsenate	
	Living Larvae	Leaves Burned	Living Larvae	Living Larvae	Leaves Burned	Living Larvae	Leaves Burned	Living Larvae	Leaves Burned
7/30									
8/6	28	No	51	28	No	22	No	11	No
8/13	40	No	89	26	No	9	No	5	No
8/20	23	No	51	23	No	4	No	2	No
8/27	15	Slight	100	11	No	5	No	2	No
9/3	0	Plts. dead	0	0	Plts. dead in stalk	75% plts. dead	in stalk		50% plts. dead

Belted Bean Beetle (*Diabrotica balteata*). (J. M. Robinson).—This insect has long been known in Mexico as doing damage to beans, cotton, and various cucurbitaceous plants. It was recorded as doing damage to beans, okra, and cucumbers in various places in Texas in 1905. In Alabama, *Diabrotica balteata* has become established as far north as Tallapoosa County

and is rather evenly distributed over the counties south of Lee and Perry. Damage by this insect was reported during the months of July, August, September, and October in the years 1922 and 1923. The low temperatures during the winter of 1923 seemed to reduce the abundance in 1924. The beetle has been observed feeding on the following plants in Alabama: bunch beans, cabbage, okra, cotton, vetch, and onions.

Pecan Weevil (*Balaninus Caryae Horn*) (H. G. Good).—When soil containing the pecan weevil larvae is treated with calcium cyanide, all the larvae are killed. However, this treatment is also detrimental to trees if used in large quantities and put too close to the trees. It causes the leaves to turn brown and drop off the tree. From hibernation cages in which 50 larvae were put in sandy loam and 50 in clay—13 of the larvae were found in the former, 10 being alive and 3 dead. In the clay soil, 7 were found, 3 of which were alive and 4 dead. Both the clay and sandy loam soils were in pots. During the examination for the weevils the adults were found about 4 inches below the surface of the clay soil while in the sandy loam they were between five and six inches from the top.

Cotton Aphis (*Aphis gossypii*). (H. G. Good).—Tests were made on the productivity of aphids. This test was started September 1, 1924, and carried through to November 15. During this time, 7 young was the maximum produced by any one aphid in a day, occuring on September 22, and the temperature was 90°. The increase in the temperature plays a very important part in productivity.

Cattle Lice Control. (F. E. Guyton).—An attempt was made to control the common chewing, and sucking lice of cattle with sodium fluoride. There was one species of chewing louse, (*Trichodectes scalaris*) and two species of sucking lice—the long-nosed ox louse (*Linognathus vituli*) and the short nosed ox louse (*Haematopinus eurysternus*). They were found principally on the head, neck, and shoulders of cattle. Infested portions of the cattle were rubbed with sodium fluoride on a clear day to prevent washing off by rain. It took approximately one ounce per animal, herd run, for the applications. This material cost 25c per pound, making the treatment cost less than two (2) cents per animal. It gave practically 100% control of all species of lice treated.

HORTICULTURE

Pears. (C. L. Isbell).—The variety test with pears contains sand or pineapple pears, hybrid pears, and the high quality European pear. To date the test indicates:

European pear trees are so susceptible to blight that all of the trees will be lost before or by the time they come into bearing. Such varieties should not be planted in this climate.

Hybrids of sand and European pears that are very susceptible to blight—LeConte for example—begin to die from blight by

the time they come into fruiting. Very few trees of such varieties should be planted in this climate.

Hybrids that are not very susceptible to damage from blight —like Kieffer and Garber—may blight but still produce well. The fruit from such trees when well ripened is fair in quality. This type of pear should be grown in this climate.

Sand or pineapple pear trees are not susceptible to damage from fire blight, but the blossoms come out in Auburn vicinity so soon in the spring that the young pears usually get killed by frost.

Peaches. (C. L. Isbell).—A variety test was started in 1919 with twenty-seven different varieties of peaches. The object of the test was to determine whether any of the newly introduced varieties were better for early, midsummer, or very late peaches than the standard varieties for these seasons. To date the indications are:

The June Elberta has promise as an early variety because it is a yellow peach with good quality for an early ripening peach, and appears to be a good yielder.

The Illinois has much promise as a midseason peach for the home orchard because of its heavy yields and fine quality. It is too tender to ship well.

The Augbert has promise for home use and local market as a yellow peach of Elberta type, ripening late. However, control of insects and diseases may make its production prohibitive.

The type of Indian peach widely grown in North Alabama from seed—and now sold under the variety name of Big Indian Blood is very high in quality and is promising as a peach for pickling purposes. Its foliage and fruit are highly susceptible to damage by sprays that do not cause much damage to standard varieties of peaches.

Pecans—Studies in Fruit Bud Formation and the Growing Habits Associated With It. (C. L. Isbell).—Further study of a technical nature was made by preparing permanent slides of sections from buds taken at different dates to illustrate development of buds at different seasons during the year.

It was found by removing second growth shoot by pruning that vegetative growth and nut production shifted to the primary part of the shoot.

A series of experiments were conducted on shoots of Delmas and Pabst varieties to determine the influence of partial defoliation, of ringing, and of a combination of these practices on vegetative growth and flower production. Shoots were treated during the last ten days in July, 1924. A comparatively small number of shoots were used in the experiment, but enough data were secured to indicate rather definitely that the following conclusions may be drawn:

The number of young shoots produced above the ring where it was partly or entirely healed was greater than the number below the ring.

The number of young shoots produced above the ring when no part of the ring healed was less than the number produced below the ring.

The vigor of the shoots produced above and below the ring was greater or less depending on the amount the ring healed. Where it healed the vigor of shoots was greater above the ring than where it did not heal.

Ringing and preventing the ring from healing reduced catkin and pistillate cluster formation in both varieties more than did defoliation.

Ringing and allowing ring to partly or entirely heal resulted in slight increase in number of catkins and decreased in number of pistillate clusters in case of both varieties.

Defoliation in general tended to increase the number of shoots produced and lower the vigor of shoots treated.

Defoliation materially reduced the number of clusters of pistillate flowers formed.

Defoliation cut down catkin flower production in case of the Delmas variety, and apparently increased it in case of the Pabst.

Ringing and defoliating to base and not allowing the ring to partly or entirely heal resulted in reduction of catkins formed in each case, in the complete prevention in case of Delmas of formation of nut clusters, and in the reduction in case of Pabst.

Ringing and defoliating to base and allowing the ring to partly or entirely heal resulted in increase in the number of catkins and pistillate clusters in case of Pabst, to considerable reduction in catkins, and complete reduction of pistillate clusters in case of Delmas.

LOCAL EXPERIMENTS

The following local experiment projects were in progress during the calendar year 1924:

Agronomy

Extensive Variety Experiment with Cotton.
Sources of Phosphate Experiment with Cotton, Corn, and Oats in Rotation in five different fields.
Rate of Applying Fertilizer to Cotton.
Extensive Variety Experiment with Corn.
Fertilizer Rotation Experiment at Albertville, Jackson, Prattville, Cusseta, Sylacauga, Hackleburg, and Brewton.
Rates of Fertilizing Corn following Legumes.
Rate of Fertilizing Cotton following Legumes.
Lime Experiments with Cotton.
Lime Experiments with Corn.
Soybean Variety Test.
Short Winter Legume Tests.
Sources of Phosphorus Tests for Winter Legumes.
Kudzu Multiplication for Hay.
Lespedeza Fertilizer Experiments.
Alfalfa Fertilizer Experiment.

Botany

Pecan Scab.
Control of Pecan Scab by Means of Sprays.
Sweet Potato Blackrot.

Engineering (Agricultural)

Soil Dynamics.
Land Clearing.

Entomology

Pecan Weevil.
Cotton Dusting.
Strawberry Root Louse.

Horticulture

Variety Test with Apples at Talladega, Alabama.
Home Orchard Tests at Athens and Gallion, Alabama.
Fertilizer and Cover Crop Test with Pecans at Selma, Alabama.